INTERGOVERNMENTAL COOPERATION IN PLANNING AND IMPLEMENTING A WASTEWATER TREATMENT FACILITY

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INTRODUCTION

Effingham County is a rural county adjacent to Chatham County in South Georgia, which has recently been impacted by the location of Fort Howard Paper Company, bringing a total investment of approximately one billion dollars with associated employment and demands on local government services. Effingham County has one of the highest population growth rates in the State of Georgia. The current population is 25,000. The population in 1970 and 1980 was 13,000 and 18,000 respectively. The only sewage treatment facilities in Effingham County, prior to the new construction, were owned and operated by the City of Springfield, Effingham County School Board and the Effingham Hospital Authority. All of these facilities were small, technologically outdated, not suited for expansion, and located in the upper reaches of Ebenezer Creek near the City of Springfield as shown in Figure 1.

Ebenezer Creek is the largest stream in Effingham County, but even at that, the creek experiences low to no flow during various times of the year. To protect water quality in Ebenezer Creek, the GA EPD required that the City of Springfield upgrade their 6.5 acre waste treatment pond to meet state mandated water quality requirements. The School Board and the Hospital Authority also had small ponds built in the 1960's. EPD required land treatment for these facilities since Ebenezer Creek has less flow than at Springfield. The City of Springfield was faced with building a land treatment system with no discharge or constructing a holding pond to hold treated sewage for up to 145 days or almost five months (40% of the year). The City of Guyton is a small city approximately five miles from Springfield, with approximately 500 residents all operating on septic tanks. Land treatment was the only option open to Guyton.

In 1986, the Effingham County Development Authority was organized and funded by a one mil tax. The purpose of the Authority was to provide orderly growth of new industry in Effingham County. In 1987, the Development Authority purchased 650 acres of land on Ebenezer Creek, approximately four miles downstream of the City of Springfield's sewage treatment facility on Ebenezer Creek.

This paper will describe how these four government entities came together technically, economically, politically,

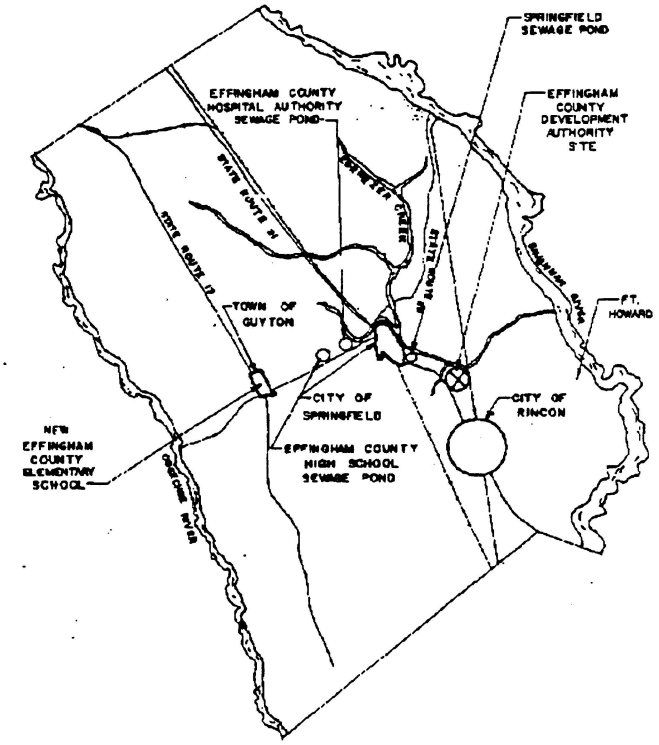

Figure 1. Wastewater Treatment Facilities.

and environmentally to serve a major portion of Effingham County with the lowest possible cost wastewater treatment facility, and the best available technology for protecting the water quality of Ebenezer Creek. The balance of this paper will discuss the technical details for beginning construction in March 1989 of a 0.5 mgd modern extended aeration treatment facility with an hydrographic control release pond.

SPRINGFIELD

Springfield is a small town with a population of approximately 1,500 people. It has 500 current water and sewer customers. In the late 1960's, the City constructed a 6.5 acre oxidation pond with 0.12 mgd capacity to serve the residents of Springfield. The increased population in Effingham Coun-

ty has resulted in increased demands on the City of Springfield's sewage treatment facilities. In 1986, the state approved an interim expansion to 170,000 gallons per day to allow time for Springfield to implement a hydrographic control release system. The Springfield interim expansion divided the existing pond into three cells in series with the use of synthetic floating baffles. A large primary cell is followed by two smaller secondary cells which treat the wastewater utilizing a phased isolation concept. It is designed for 0.17 mgd to meet effluent limitations of 40 mg/l BOD, 90 mg/l suspended solids. The pond is 7.5 feet deep and has a continuous flow monitoring device at the effluent structure.

The Coastal Area Planning and Development Commission predicts for the City of Springfield and surrounding area an 80% increase in population between now and the year 2000. The City of Springfield has been under an upgrade requirement to meet State Water Quality Standards for Ebenezer Creek due to low stream flow in the creek. Springfield was faced with the following three alternatives for meeting the future wastewater discharge requirements because of the extreme low flows in Ebenezer Creek: 1) transport the effluent of existing facility to another receiving stream which has more flow and less stringent waste load allocations; 2) upgrade the existing pond and release the effluent during periods when stream flows are above 20 cfs; 3) treat and dispose of the existing effluent by land application with no discharge.

The first alternative was rejected because the only receiving stream with a greater assimilation capacity than Ebenezer Creek was the Savannah River which was too far from Springfield. The final alternatives considered were as follows: 1) secondary treatment plant with a hydrographic control release at the existing site; 2) secondary treatment plant with hydrographic control release at the Development Authority site and 3) land treatment system. The above alternatives were evaluated considering economic and environmental factors. All the alternatives met Georgia Environmental Protection Division (GA EPD) water quality objectives.

Table 1 presents an economic evaluation of the alternatives discussed above. The total annual cost, which is used for comparison, consists of the original cost amortized over a 20-year period at a rate of 7% and the annual operation and maintenance costs.

Table 1. Economic Evaluation Of Alternatives

ITEM	NO. 1	NO. 2	NO. 3
Initial Capital Cost	2,188,054	2,305,000	2,455,500
Annual O & M Cost	145,600	145,600	179,200
P.W. of O & M Cost	1,542,482	1,542,482	1,898,440
Total Present Worth	3,730,536	3,847,482	4,353,940

Table 2. Rank Of Alternatives

Categories	NO. 1	NO. 2	NO. 3
Environmental	2	1	2
Monetary Costs	1	2	4
Contribution to Objective	2	2	2
Energy and Resources Use	1	1	3
Reliability	1	1	1
Acceptability	3	1	1
Totals	10	8	16

The environmental effects presented in Table 2 that pertain to each of the alternatives are as follows: (1) each of the alternatives would lead to an improvement in the water quality of Ebenezer Creek; (2) each alternative may have temporary adverse environmental effects during construction; (3) none of the alternatives would have significant impacts on ecological systems, air quality or aesthetics; (4) none of the alternatives would have significant secondary environmental effects;(5) the land treatment alternative may have a temporary effect on some terrestrial wildlife; (6) the land treatment alternative would require the commitment of approximately 85 acres of land, pre-empting alternative uses in the future; (7) the treatment plant at the existing site alternate would have an impact on the community growth patterns and land use trends by discouraging the continuance of residential growth in the area.

SELECTED PLAN

Alternative 2, which consists of abandoning the existing site and building a secondary treatment plant with an HCR system, ranks higher than both the other alternatives. The added costs associated with moving the plant downstream are overridden by the environmental and acceptability factors. Building a treatment plant and nine acre storage pond at the existing site would discourage the residential development trend occurring in this area. This trend includes a second and third phase for the residential development just south along Ash Street Extension as well as a multi-family development just across the street. The Development Authority site had no developments surrounding it and was used in the past for timber production. The downstream sites require a 90-day holding pond instead of 145 days due to higher stream flows.

The other factor which weighed toward Alternative 2 was acceptability by the public. The existing pond site is located within Springfield, and complaints have been made concerning the existing odor. Any expansion to the facility in its current location would not enhance its acceptability to the existing residential development surrounding it. The Development Authority site is very secluded with little chance of there being any problems of acceptability. Moreover, the Development Authority wants a treatment plant at their site.

DESCRIPTION OF TREATMENT SYSTEM

Abandoning the existing treatment pond will involve removal of the influent and effluent structures, baffles, and piping between the pump station and influent structure. The pond will eventually be converted to a City fish pond and recreational park.

The existing pneumatic injector pump station will be rehabilitated into a triplex submersible pump station. This will require demolition of the existing pump house, conversion of the existing dry well into a wet well, and installation of concrete slab and hoist beam. The new pump station will have one large pump capable of pumping the 20-year peak flow (800 gpm) and two smaller pumps with 400 gpm capacity.

The twelve inch force main will run along Ash Street Extension, power easements, State Route 21, and property lines. Some easements will be required along the force main route because of restrictions in the amount of usable road right-of-way. The force main will discharge into a concrete chamber with steps which will be used for releasing the hydrogen sulfide gas prior to it entering the aeration basin.

The extended aeration treatment plant will be designed utilizing the following criteria and as shown in Figure 2 - Process Flow Diagram:

Flow	0.50 MGD
Influent:	BOD_5 250 mg/l
	NH_3N 30 mg/l
Effluent:	BOD_5 25 mg/l
	NH_3N 5 mg/l
	D.O. 2 mg/l

A two channel aeration basin will be constructed above ground with ample room for the future addition of channels, if necessary.

The aeration basin effluent will enter a forty foot diameter clarifier and then a chlorine contact chamber (30 minutes retention time). Sludge will be pumped utilizing two 300 gpm submersible pumps. A thirty foot diameter aerobic digestor will be utilized prior to the sludge drying beds. The sludge drying beds will have approximately 8,750 square feet or 1.75 square feet/capita.

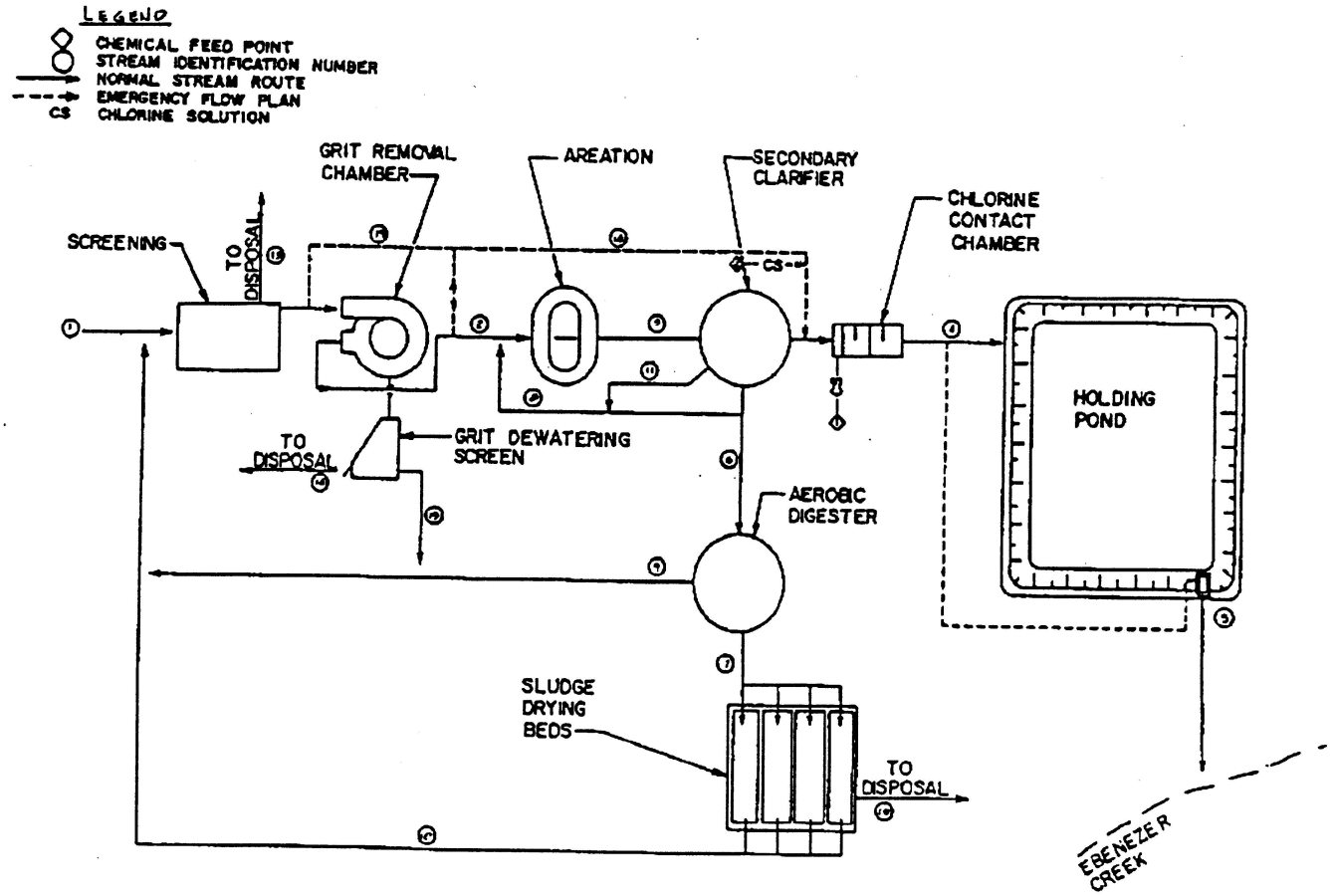

Figure 2. 0.5 MGD Wastewater Treatment Facility.

A stage-discharge relationship will be developed for Ebenezer Creek at the site. The treatment plant effluent will gravity flow into a junction box with manually operated slide gates. When the creek flows are sufficient for release of all the effluent, the slide gate will be opened all the way. When only a portion of the flow is allowed to enter the stream, the slide gate will be partially closed and the remaining effluent will flow into the storage pond pump station. When no discharge is allowed, the slide gate will be completely closed. 100% of the effluent will enter the pond. The United States Geological Survey will operate a gaging station to give stream flow readings continuously via telephone line to the sewage treatment plant. When stream flows are high, the pond effluent and plant effluent will be released by gravity simultaneously in accordance with the NPDES permit.

The storage pond will be approximately nine acres and have a depth of eleven feet. A one-and-one-half foot minimum depth will be maintained at all times to minimize maintenance requirements. Two feet of freeboard will be provided. This pond is sized for a 90-day storage volume of the projected 5-year flows.

A concrete and fiberglass flume structure with flow recorder will be constructed along the common treatment plant and storage pond effluent channel. This will allow the treatment facility effluent flow rate to be monitored on a continuous basis.

INDIVIDUAL VERSUS COMBINED FACILITIES

The cost of the individual facilities to the four cooperating governments is shown in Table 3. The cost of a joint project lead by Springfield is shown in Table 4.

Table 3. Individual Construction Costs

	Type of Facility	Design/Flow (mgd)	Est. Constr. Cost
Guyton	55 acres Land Treatment	0.13	$1,500,000
School Board	25 acres Land Treatment	0.06	$1,000,000
Springfield	35 acres Secondary Treatment and HCR	0.50	$2,000,000
Industrial Authority	20 acres Secondary Treatment and HCR	0.50	$2,000,000
Totals	135 acres	1.19	$6,500,000

Table 4. Joint Construction Costs.

	SEWAGE TREATMENT PLANT	TRANSPORT SYSTEM COST	IMPACT FEES
Guyton	.0	$ 150,000	$ 50,000 (1989)
School Board	.0	$ 600,000	$ 700,000 (1989)
Springfield	.5 mgd 20 acre Secondary Plant and HCR	$2,000,000	$ 592,000 (future)
Industrial Authority	.0	$ 300,000	$ 250,000 (future)
Totals	.5 mgd 20 acre Secondary Plant and HCR	$3,050,000	$1,984,000

CONCLUSIONS

It is clear from the above analysis that individual facilities cost twice as much as a joint facility and require over six times as much land. Rural counties may not have the resources to initiate the advanced technology to protect our water quality resources without combining efforts. The joint project described here permits the use of Ebenezer Creek at a point where the stream flow was the highest or where the tributary watershed was largest. The pooling of resources resulted in at 50% - 70% less cost than building individual treatment plants. A modern wastewater treatment facility for Springfield, the School Board, the Development Authority and Guyton individually would not have been possible or would have resulted in excessive public debt and high sewage bills. All government agencies providing public water and sewer services should come to the table with coordinated planning efforts based on economics and environmental resources. The goal of all public agencies should be to provide public services at the lowest possible cost, while protecting our water resources.